CLAIMS

1-43. Canceled.

44. (New) A method for adding and dropping channels from an optical transmission medium, comprising:

receiving an input signal having at least two input channels;

selecting a wavelength;

generating an add signal having at least one add channel at the selected wavelength;

transmitting the input channels and the add channels through an optical switch matrix, the optical switch matrix having one or more optical switches that are capable of redirecting the input channels and the add channel as they pass through the optical switch matrix; and

outputting an output signal by configuring the one or more optical switches of the optical switch matrix so that at least one of the input channels is replaced by the at least one add channel at the selected wavelength.

45. (New) The method of claim 44 wherein each input channel has specific wavelengths.

46. (New) The method of claim 45 wherein the input signal is a wavelength-division-multiplexed optical signal.

47. (New) The method of claim 44 further comprising multiplexing channels to produce a multiplexed output signal.

48. (New) The method of claim 44 wherein the optical switch matrix is a microelectrical mechanical system having an array of micromirrors arranged on a substrate.

49. (New) The method of claim 48 wherein each micromirror is capable of being in one of a first state for redirecting light passing in close proximity to the micromirror, and a second state in which light passing in close proximity to the micromirror is not redirected.

50. (New) The method of claim 44 wherein the optical switch matrix is an array of bubble switches, each being capable of redirecting light.

51. (New) The method of claim 50 wherein each bubble switch is capable of being in one of a first state for redirecting light passing through the optical switch matrix, and a second state in which light is not redirected as the light passes through the optical switch matrix.

52. (New) A method for adding and dropping channels, the method comprising:

generating add channels at selectable wavelengths,

transmitting input channels and said add channels through an optical switch matrix, the optical switch matrix having one or more optical switches that are capable of redirecting the input channels and the add channels as they pass through the optical switch matrix; and

configuring the one or more optical switches of the optical switch matrix so that at least one of the input channels is redirected away from a corresponding path through the optical switch matrix and so that at least one of the add channels is redirected to that path.

53. (New) The method of claim 52 further comprising demultiplexing an input optical signal to provide said input channels.

54. (New) The method of claim 53 wherein each said channel has a specific wavelength.

55. (New) The method of claim 54 wherein the input signal is a wavelength-division-multiplexed optical signal.

56. (New) The method of claim 52 further comprising multiplexing ones of the channels to produce a multiplexed output optical signal.

57. (New) The method of claim 52 wherein the optical switch matrix is a microelectrical mechanical system having an array of micromirrors arranged on a substrate.

58. (New) The method of claim 57 wherein each micromirror is capable of being in one of a first state for redirecting a channel passing in close proximity to the micromirror, and a second state in which a channel passing in close proximity to the micromirror is not redirected.

59. (New) The method of claim 52 wherein the optical switch matrix is an array of bubble switches, each being capable of redirecting a channel.

60. (New) The method of claim 59 wherein the bubble switches are capable of being in one of a first state for redirecting a channel

passing through the optical switch matrix, and a second state in which a channel is permitted to pass through the optical switch matrix.

61. (New) A device for adding data to an optical signal having a plurality of channels, comprising:

a plurality of input channels, one or more of the plurality of input channels being directed to one or more optical switches;

one or more tunable light sources providing one or more additional channels directed the one or more optical switches; and

a controller that configures the one or more optical switches so as to selectively add each one of the one or more additional channels to one of the plurality of channels of the optical signal.

62. (New) The device of claim 61 further comprising a selector that selects, for each one of the one or more additional channels, an optical switch that adds the one or more additional channels.

63. (New) The device of claim 61 further comprising a demultiplexer that demultiplexes an input optical signal to provide the input channels to the one or more optical switches.

64. (New) The device of claim 62, wherein each channel of the input optical signal has specific wavelengths.

65. (New) device of claim 63, wherein the input optical signal is a wavelength-division-multiplexed optical signal.

66. (New) The device of claim 61 further comprising

a multiplexer that multiplexes at least ones of the input channels and the add channels to produce a multiplexed output optical signal.

67. (New) An optical switching device, comprising:

an optical switch matrix having one or more optical switches that are capable of redirecting optical channels passing therethrough;

an input port coupled to the optical switch matrix that receives at least one input channel and transmits the at least one channel to the optical switch matrix;

an output port coupled to the optical switch matrix that receives at least one output channel from the optical switch matrix;

a tunable add port coupled to the optical switch matrix that inputs add channels to the optical switch matrix, each said add channel being tuned to a selected wavelength by said add port; and

a drop port coupled to the optical switch matrix that receives dropped channels from the optical switch matrix;

wherein the switches of the optical switch matrix can be selectively configured so that at least one of the input channels is directed to the drop port and at least one add channel is directed to the output port.

68. (New) The optical switching device of claim 67 wherein the optical switch matrix includes a first array of switches and a second array of switches.

69. (New) The optical switching device of claim 68 wherein the first array of switches and the second array of switches are respective N x M arrays of switches, and the input port and the drop port are coupled to the

first array of switches, and the add port and the output port are coupled to the second array of switches.

70. (New) The optical switching device of claim 69, wherein the optical switch matrix is a microelectrical mechanical system having an array of micromirrors arranged on a substrate.

71. (New) The optical switching device of claim 70, wherein the first array of switches redirects optical channels from the input port to the drop port, and the second array of switches redirects optical channels from the add port to the output port.

72. (New) The optical switching device of claim 68, wherein the first array of switches is an M x M array of switches, the second array of switches is an N x M array of switches, the add port is coupled to the first array of switches and the input port, output port, and drop port are coupled to the second array of switches.

73. (New) The optical switching device of claim 72, wherein the optical switch matrix is a microelectrical mechanical system having an array of micromirrors arranged on a substrate.

74. (New) The optical switching device of claim 73, wherein an input channel is re-directed to a drop port by a front surface of a first micromirror of the N x M array of switches, and an add channel is redirected to an output port by a front surface of a second micromirror of the first array of switches and a back surface of the first micromirror of the second array of switches.

75. (New) The optical switching device of claim 68, wherein the first array of switches is an N x M array of switches, the second array of switches is an M x M array of switches, and the drop port is coupled to the second array of switches and the input port, output port, and add port are coupled to the first array of switches.

76. (New) The optical switching device of claim 75, wherein the optical switch matrix is a microelectrical mechanical system having an array of micromirrors arranged on a substrate.

77. (New) The optical switching device of claim 76, wherein an input channel is re-directed to a drop port by a front surface of a first micromirror of the first array of switches and a front surface of the second array of switches, and an add channel is redirected to an output port by a back surface of the first micromirror of the first array of switches.

78. (New) The optical switching device of claim 77 wherein the optical switch matrix is a microelectrical mechanical system having an array of micromirrors arranged on a substrate.

79. (New) The optical switching device of claim 78, wherein an input channel is redirected to a drop port by a front surface of a first micromirror and an add channel is redirected to an output port by a back first surface of the first micromirror.

80. (New) An optical switching device, comprising:

an optical switch matrix having one or more optical switches that are capable of redirecting optical channels passing therethrough;

an input port coupled to the optical switch matrix that receives at least

one input channel from an optical transmission medium and transmits the at least one channel to the optical switch matrix;

an output port coupled to the optical switch network that receives at least one output channel from the optical switch matrix and transmits the at least one output channel to an optical transmission medium;

a tunable add port coupled to the optical switch matrix that inputs add channels to the optical switch matrix, each said add channel being tuned to a selected wavelength by said add port; and

a drop port coupled to the optical switch matrix that receives dropped channels from the optical switch matrix;

wherein the switches of the optical switch matrix can be selectively configured so that at least one of the input channels is directed to the drop port and at least one add channel is directed to the output port and wherein the optical switch matrix is an array of bubble switches, each being capable of redirecting light.

81. (New) Apparatus comprising

an optical switch matrix,

an input port adapted to launch a plurality of input channels at a particular one of a plurality of wavelengths into said optical switch matrix,

an output port, said input and output ports and said optical switch matrix being such that each of said input channels can pass through said optical switch matrix to said output port, said optical switch matrix being operable to divert any one of said input channels away from said output port,

an add port adapted to launch add channels into said optical switch matrix, said add port and said optical switch matrix being arranged such that any of said add channels can be directed to said output port at any of said wavelengths.

82. (New) Apparatus comprising

a first optical switch array and a second optical switch array,

an input port adapted to launch a plurality of input channels at respective ones of a plurality of wavelengths into said first optical switch array, said input port and said first optical switch array being such that each of said input channels can pass through said first optical switch array to said second optical switch array, said first optical switch array being operable to divert any of said input channels away from said second optical switch array,

an output port, said output port and said second optical switch array being such that each of said input channels passed to said second optical switch array can pass through said second optical switch array to said output port, and

an add port adapted to launch add channels into said second optical switch array, said add port and said second optical switch array being such that any of said add channels can be directed to said output port at any of said wavelengths.

83. (New) Apparatus comprising

a first optical switch array and a second optical switch array,

an input port adapted to launch a plurality of input channels at respective ones of a plurality of wavelengths into said first optical switch array,

an output port, said input and output ports and said first optical switch array being such that each of said input channels can pass through said first optical switch array to said output port, said first optical switch array being operable to divert any of said input channels away from said output port, and

an add port adapted to launch add channels into said second optical switch array, said add port and said second optical switch array being such that, and said second optical switch array being operable such that, any of said add

channels can be directed to said output port at any of said wavelengths via said first optical switch array.

84. (New) Apparatus comprising

a first row-and-column optical switch array and a second row-and-column optical switch array, the columns of said first and second optical switch arrays being aligned with one another,

an input port and an output port, said input port being adapted to launch a plurality of input channels along respective rows of said first optical switch array to said output port, an add port adapted to launch add channels along respective rows of said second optical switch array, said second optical switch array being operable to divert any of said add channels along any of the columns of said second optical switch array to the aligned column of said first optical switch array,

said first optical switch array having a micromirror at each row/column intersection, each said micromirror having a reflective first surface and a reflective second surface and being operable to reflect an input channel from said front reflective surface and thereby divert that input channel from its respective row, and to reflect an add channel from said second surface and thereby divert that add channel from its respective column onto the row of the diverted input channel.

85. (New) The invention of claim 84 wherein said first and second surfaces are front and back surfaces, respectively.

86. (New) Apparatus comprising

a first optical switch array comprising a plurality of micromirrors each having a reflective first surface and a reflective second surface,

a second optical switch array,

an input port adapted to launch a plurality of input channels at respective ones of a plurality of wavelengths into said first optical switch array,

an output port, said input and output ports and said first optical switch array being such that each of said input channels can pass through said first optical switch array to said output port, at least an individual one of said micromirrors being operable to cause a respective input channel to be reflected off the first surface of that micromirror and be thereby diverted from said output port, and

an add port adapted to launch add channels into said second optical switch array, said add port and said first and second optical switch arrays being such that, and said second optical switch array being operable such that, any of said add channels can be directed to the second surface of any operated one of said micromirrors and thereby be directed to said output port at any of said wavelengths.

87. (New) The invention of claim 86 wherein said first and second surfaces are front and back surfaces, respectively.

88. (New) A micro electrical mechanical optical switch matrix of a type comprising an array of micromirrors that are rotatably mounted on a substrate, characterized in that at least one said mirrors has a reflective first surface and a reflective second surface.

89. (New) The invention of claim 88 wherein said first and second surfaces are front and back surfaces, respectively.